



## The Effectiveness of Realistic Mathematics Learning in Improving Students' Understanding of Mathematics Concepts in Grade 3 of SDIT Al-Kautsar Cikarang

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### ARTICLE INFO

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**Abstract.** This study begins with the problem of lack understanding of mathematics learning concepts in SDIT Al-Kautsar Cikarang students. This causes student learning outcomes to be not optimal. Therefore, this study aims to test the effectiveness of Realistic Mathematics learning in improving the understanding of mathematical concepts of grade 3 students of SDIT Al-Kautsar Cikarang. The method used in this research is Pre-Experimental Design with One-Group Pretest-Posttest Design model. The data were analyzed through T-test (Paired Sample T-Test) and effectiveness test (N-Gain Score Test). The object of research is third grade students (3C) SDIT Al-Kautsar Cikarang, which amounted to 20 students. Data were collected through pre-test and post-test results. The results showed that the Sig. (2-tailed) on the Paired Sample T-Test analysis was 0.000, or less than 0.05. The average score also shows that the post-test results have an average score of 55.5, compared to the pre-test score of 89.2. The N-Gain Score test results based on the effectiveness criteria interpreted from the normality gain value show a value of 0.77, or more than 0.7. Based on this, it can be concluded that Realistic Mathematics is effective in improving students' understanding of mathematical concepts.

### INTRODUCTION

Mathematics is a study with a wide range related to numbers, quantities, shapes, and patterns. It involves exploring, analyzing, and problem-solving relationships through logical reasoning and systematic methods, (Sadewo, 2022; Herlina, 2022; Hapsari et al.,

2022). In daily life, problem-solving in mathematics uses the ability to measure, calculate, compare, reason, and others. Firdaus et al., (2015) emphasized that mathematics as one of the disciplines contributes to the development of science and technology, solutions to life problems, and equips thinking and argumentative skills.

However, as a discipline, mathematics is often considered a difficult subject to understand for most people. Nurhasanah (2010) stated that mathematics is a science with an abstract object of study. This is because objects or symbols do not exist are intangible in daily life and can only be imagined in the mind's imagination.

The examples that illustrate the above statement can be found in everyday life, such as the concept of circles in geometry. It is often possible for most people to think that objects such as bracelets, rings, and wall clocks are circles, but this is a wrong concept because they are examples of objects that form a circle. Another example can also be found in the concept of numbers. For example, the number five (5) is essentially an abstract thing. The concept of "five" as a number will be meaningful when in its mention it is associated with other objects such as five shirts, five books, etc. The number "five" can be symbolized as "5", which is a number that is a sign or symbol to symbolize the number.

Abstraction in mathematics is one of the main reasons why many students find it difficult with this subject. Mathematics is one of the most difficult subjects for many students (Quintero et al., 2016; Saputro et al., 2024). Mathematical concepts are often not directly related to students' daily experiences, making it difficult for them to visualize or apply them in real contexts. This is a major concern in the world of education because it can affect academic performance and students' attitudes towards this subject.

Mathematics teaching often focuses on the application of formulas and procedures, without placing sufficient emphasis on the understanding of basic concepts and their practical relevance, (Sadewo, 2021; Saputro et al., 2023). Difficulties in understanding mathematics can also be influenced by ineffective teaching methods and lack of additional support. Many students face difficulties in understanding mathematical concepts due to teaching methods that focus too much on memorization rather than understanding. A rigidly structured and inflexible math curriculum can cause students to feel stressed, tired and even bored. In addition, the lack of interactions that spark students' interest and creativity in learning math also contributes to negative perceptions of the subject.

Teachers have a central role in realizing students achieve the goal of understanding mathematical concepts. Teachers should have the view that learning mathematics is not just material for memorizing mathematical formulas and answering questions and exams

using appropriate formulas. But more than that, students can understand the concepts learned and can apply them in real life using logical and appropriate reasoning. Students should be able to understand the mathematical concepts taught and have the experience to solve problems using logical and appropriate mathematical reasoning.

There are many methodologies or approaches that teachers can use as learning to help students understand mathematical concepts. One of the learnings that can accommodate students in developing an understanding of mathematical concepts is Realistic Mathematics (Fitriani & Maulana, 2016). Realistic Mathematics is a mathematics teaching approach that emphasizes the application of mathematical concepts in a real context and is relevant to students' daily lives. Realistic Mathematics is an approach that starts from real problems for students, prioritizing process skills (the process of doing mathematics), discussion and collaboration, and interactive (peer tutors) with the intention that they have full power to experiment both individually and in groups (Ahmad & Asmaidah, 2017; Sirait & Azis, 2017).

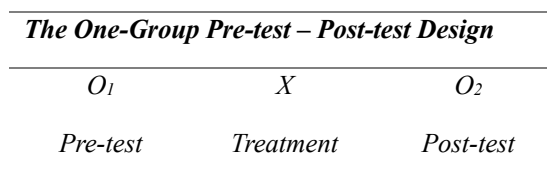
The realistic mathematics approach aims to make mathematics more meaningful and interesting by connecting it to practical situations that students face. In RME, teachers play a role in facilitating the learning process to enable optimal interaction and apply scaffolding (Özkaya & Karaca, 2017). In realistic mathematics, students not only learn theories and formulas abstractly but also understand how mathematical concepts are applied in real life. This is important because connecting math to everyday situations helps students see the real usefulness of what they are learning, thus increasing their motivation and interest in learning.

Based on the description above, this research aims to test the effectiveness of Realistic Mathematics learning in improving the understanding of mathematical concepts of grade 3 students of SDIT Al-Kautsar Cikarang.

## **METHOD**

In this research, the method used was the quantitative method. This research is included in the Pre-Experimental Design type. Sugiyono (2015: 108-109) explains "It is said to be a pre-experimental design because this design is not yet a real experiment. Because there are still outside variables that contribute to the formation of the dependent variable. So, the dependent variable's experimental results are not merely influenced by the independent variable. This can occur because there are no control variables, and the sample is not randomly selected". There are several types of pre-experimental designs, namely:

One-Shot Case Study, One-Group Pretest-Posttest Design, and Intact-Group Comparison. Based on this, the research design used in this study is a form of design with a one-group pretest-posttest design. Pre-Experimental Design: A one-group pretest-posttest design is a part of experimental research where a group will be measured and observed before and after a treatment as described in the following figure:



**Figure 1. Research Model of One-Group Pre-test - Post-test Design**

The implementation of this research was located at SDIT Al-Kautsar Cikarang. SDIT Al-Kautsar Cikarang Baru is an Integrated Islamic Elementary School that has a superior Tahsin and Tahfiz program and implements bilingual learning, character building, and life skills. This school is located on Jl. Komodo 1A, Jayamukti, Central Cikarang District, Bekasi Regency, West Java Province. the researcher gave treatment to students.

The research was carried out in 2 days, there are on Monday, September 2, 2024, and Wednesday, September 4, 2024. The following is the schedule of the research carried out:

**Table 1. Schedule of research implementation**

<b>SCHEDULE OF RESEARCH IMPLEMENTATION</b>		
<b>No</b>	<b>Activities</b>	<b>Date</b>
<b>Research Day 1</b>		
1	Pre-test	Monday
2	Treatment 1	02/09/2024
<b>Research Day 2</b>		
3	Treatment 2	Thursday
4	Post-test	04/09/2024

The participant in this research was students in class 3C SDIT Al-Kautsar Cikarang. The number of students in class 3C amounted to 20 students where there were 11 male students and 9 female students. This participant collection is a technique of saturated sampling. The saturated sampling technique is a sampling technique if the entire population is used as a sample. The data collection techniques used were pre-test and post-test. The pre-test is given before students receive the first treatment, while the post-test is given after students receive the second treatment. The collected data would be analyzed through the effectiveness test (N-Gain Score Test) and T-test (Paired Sample T-Test). The effectiveness test (N-Gain Score Test) was used to measure the effectiveness of realistic mathematics learning on students' understanding of mathematics concepts in grade 3 of SDIT Al-Kautsar Cikarang. The Paired Sample T-Test was conducted to measure whether there was an improvement in students' understanding of mathematical concepts or not after using Realistic Mathematics learning.

## **RESULTS AND DISCUSSION**

### **Results**

The implementation of Realistic Mathematics in this study was passed in 3 series through pre-test, treatment, and post-test. At the pre-test stage, before the treatment is given, the researcher took an initial measurement of the variables to be studied. The purpose of the pre-test is to see the initial condition of the group that will be given treatment. In addition, the pre-test provides data that will be used to compare changes that occur after treatment. In this section, researchers measure students' abilities through 10 multiple-choice questions that have been tested for validity and reliability and have been adjusted based on their level of difficulty. The giving of this pre-test question was carried out on the first day with the initial 30 minutes when the researcher gave treatment to students.

After the pre-test was conducted, the researcher would apply the treatment to the experimental group. The researcher conducted the treatment for 2 days, with each of them lasting 60 minutes/day. The researcher presented material about multiplication using a realistic mathematics approach. In the beginning, the researcher threw an inquiry question and invited students to respond to the problem of the question. Here the researcher wanted to develop students' self-confidence. Then after that, the researcher invited students to discuss. Here the researcher began to include the concept of multiplication to students. The researcher used the help of illustrations from PowerPoint and also brought real props to make learning more fun. After discussing the concept of multiplication, the researcher

divided the students into 4 large groups. The researcher gave worksheets containing problems in everyday life involving multiplication operations. Then after that, the researcher invited students to compare and discuss the answers. The researcher thoroughly discussed the problems. The researcher convinced students to understand the material provided. This lasted for 2 days. During the 2 days of treatment, the students showed their interest in this learning model, as seen by their enthusiasm when participating in learning.

After conducting treatment for 2 days, the post-test was given to assess whether there were changes that occurred as a result of the treatment given. Students were asked to do a post-test containing 10 multiple-choice questions that had been tested for validity and reliability, as well as the weight of the questions that had been adjusted.

The data in the results of this study were calculated using the help of the SPSS application with version 26.0. The data from the pre-test and post-test results are presented in the following table.

**Table 2. Pre-test - Post-test Class Data Description**

	<b>Pre-test</b>	<b>Post-test</b>
<i>Number of Students</i>	20	20
<i>Minimum</i>	40.00	80.00
<i>Maximum</i>	75.00	100.00
<i>Mean</i>	55.5	89.25
<i>Std. Deviation</i>	11.57356	5.68354

Based on Table 2, it can be seen that the pre-test results have a range of values ranging from 40 to 75, with an average value of 55.5, and a *standard deviation* value of 11.57. While the post-test results have a range of values ranging from 80 to 100, with an average value of 89.25, and a *standard deviation* of 5.68.

After the pre-test and post-test data is obtained, the N-Gain test can be conducted. This test was conducted to measure the effectiveness of Realistic Mathematics in improving students' concept understanding. Measuring the level of effectiveness is done by calculating the normalized Gain score based on the formula (Sundayana, 2018):

$$N - Gain = \frac{\text{skor posttest} - \text{skor pretest}}{\text{skor maksimal} - \text{skor pretest}}$$

**Table 3. N-Gain Test Results**

	<i>NGain_Score</i>	<i>Valid N (listwise)</i>
<i>N</i>	20	20
<i>Minimum</i>	.64	
<i>Maximum</i>	1.00	
<i>Mean</i>	.7733	
<i>Std. Deviation</i>	.1024	

Based on table 3 above, it can be seen that the average value of the N-Gain Score results is 0.77, and it is included in the high category based on the effectiveness criteria interpreted from the gain normality value. This indicates that Realistic Mathematics learning is effective on improving students' understanding of mathematical concept.

Before conducting further data analysis, a normality test must first be carried out. Normality test is a prerequisite test before conducting the Paired Sample T-test. The Normality test serves to determine whether the sample data coming from the population is normally distributed or not. If the normality test is qualified with a significant value  $> 0.05$ , then the data can be analyzed using parametric statistics, in this case the test using the Paired Sample T-test. Otherwise, if the normality test does not meet the requirements, then in analyzing the data will use nonparametric data analysis. To test whether the data is normally distributed or not, it can be done with the following decision-making guidelines:

1. If the significant value (Sig.)  $> 0.05$ , then the research data is normally distributed.
2. If the significant value (Sig.)  $< 0.05$ , then the research data is not normally distributed.

**Table 4. Normality Test**

<b>Saphiro-Wilk</b>			
	Statistic	df	Sig.
<b>Pre-test</b>	.932	20	.165
<b>Post-test</b>	.920	20	.098

In Table 3, there are results from the normality test. The data is read based on the results of Saphiro-Wilk. Saphiro Wilk is used because the number of samples is relatively

small, which is less than 50. Based on the data exposed in Table 3, in the Saphiro-Wilk test, it can be seen that the significant value in the pre-test results is 0.165 and the significant value in the post-test results is 0.098. Both of these result values have a sig. > 0.05, so it can be concluded based on the decision-making guidelines about the requirement that both data are normally distributed.

After conducting the normalization test as a prerequisite test, the next step is to conduct the Paired Sample T-test. A Paired Sample T-Test was conducted to measure whether there was an improvement in students' understanding of mathematical concepts or not after using Realistic Mathematics learning, as evidenced by the sig value <0.05 with the basis of the hypothesis as follows:

H<sub>0</sub>: There is no improvement in students' understanding of mathematical concepts after using Realistic Mathematics learning.

H<sub>1</sub>: There is an improvement in students' understanding of mathematical concepts after using Realistic Mathematics learning.

**Table 5. Paired Samples Test Results**

		<b>Pair 1</b>
		<b>Pre-test - Post-test</b>
<b>Mean</b>		-33.75000
<b>Std. Deviation</b>		7.41176
<b>Std. Error Mean</b>		1.65732
<b>95% Confidence Interval of the Difference</b>	Lower	-37.21881
	Upper	-30.28119
<b>T</b>		-20.364
<b>Df</b>		19
<b>Sig. (2-tailed)</b>		.000



Based on the results of the Paired Sample Test, the significance value (2-tailed) of  $0.000 < 0.05$  means that  $H_0$  is rejected, and  $H_a$  is accepted. This shows that there is an improvement in students' understanding of mathematical concepts after using Realistic Mathematics learning.

### **Discussion**

Based on the results of the research previously described, it is found that the Realistic Mathematics approach is effective in improving students' understanding of mathematical concepts. The results of this study are in line with Agustina et al. (2020), Hasanah et al. (2023), and Sugriani (2019) who found that Realistic Mathematics learning is effective in improving students' understanding of mathematical concepts.

There is an improvement in students' understanding of mathematical concepts through Realistic Mathematics learning. Realistic Mathematics helps students understand mathematical concepts that can be used in solving mathematical problems in everyday life. This character of RME is supported by Van den Heuvel-Panhuizen & Drijvers (2020) who mention that realistic has a broader connotation, and it refers to offered problem situations which students can imagine. Mathematics learning activities by applying the Realistic Mathematics approach increase students' involvement in learning. The study by Mulbar & Zaki (2018), describe that by using RME, students are more active, have an energy and motivation to learn. This study is show that RME may improve the quality of learning process in class. Students feel they have discovered something new from their previous learning and are actively involved in the realistic mathematics approach (Hasanah et al., 2023).

### **CONCLUSION**

Based on the results of the research and discussion previously, it is concluded that the Realistic Mathematics approach to learning mathematics on the topic of multiplication has a positive effect on students' understanding of mathematical concepts. Realistic Mathematics is effective in improving students' understanding of mathematics concepts in grade 3 of SDIT Al-Kautsar Cikarang. There is an improvement in students' understanding of mathematical concepts through Realistic Mathematics learning. There are several recommendations that can be given to teachers and future researchers. Teachers are advised to use the Realistic Mathematics Approach to improve students' ability to understand math concepts and improve students' ability to solve math problems. Then, future researchers are

expected to conduct further research in investigating other factors that affect the improvement of understanding of mathematical concepts to gain more comprehensive insights.

## REFERENCES

- Afriansyah, E. A. (2016). Makna Realistic dalam RME dan PMRI. *LEMMA*, II(2), 96–104.
- Agustina, N., Pranata, O. H., & Nugraha, A. (2020). Penggunaan Pendekatan Realistic Mathematics Education (RME) dalam Meningkatkan Pemahaman pada Materi Penjumlahan Pecahan di Kelas V Sekolah Dasar. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 7(4), 91-99.
- Ahmad, M., & Asmaidah, S. (2017). Pengembangan Perangkat Pembelajaran Matematika Realistik untuk Membelajarkan Kemampuan Pemecahan Masalah Matematika Siswa SMP. *Mosharafa: Jurnal Pendidikan Matematika*, 6(3), 373–384.
- Ardianti, P. (2022). Pengaruh Model Pembelajaran Matematika Realistik Terhadap Kemampuan Pemahaman Konsep Matematis Siswa Kelas IV SD N 1 Taman Cari Lampung Timur (Doctoral dissertation, Institut Agama Islam Negeri Metro).
- Cipta, R., & Ibrahim, M. Abdurrahman, Mulyono. (2012). Anak Berkesulitan Belajar: teori, diagnosis, dan remediasinya. Jakarta: Rineka Cipta. Agus Suprijono, 2009. Cooperative Learning Teori & Aplikasi PAIKEM.. Yogyakarta: Pustaka Belajar.
- Arifin, Zainal. 2009. Evaluasi Pembelajaran. Bandung: PTRemaja Rosdakarya Offset. *PROCEEDING ICETE 2016*, 558.
- Fahrudin, A. G., Zuliana, E., & Bintoro, H. S. (2018). Peningkatan pemahaman konsep matematika melalui realistic mathematic education berbantu alat peraga bongpas. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, 1(1), 14-20.
- Firdaus, F., Kailani, I., Bakar, M. N. Bin, & Bakry, B. (2015). Developing Critical Thinking Skills of Students in Mathematics Learning. *Journal of Education and Learning (EduLearn)*, 9(3), 226.
- Fitriani, K., & Maulana. (2016). Meningkatkan Kemampuan Pemahaman dan Pemecahan Masalah Matematis Siswa SD Kelas V melalui Pendekatan Matematika Realistik. *Mimbar Sekolah Dasar*, 3(1), 40–52. <https://doi.org/10.17509/mimbar-sd.v3i1.2355>

- Hadi, S., & Kasum, M. U. (2015). Pemahaman konsep matematika siswa smp melalui penerapan model pembelajaran kooperatif tipe memeriksa berpasangan (pair checks). *EDU-MAT Jurnal Pendidikan Matematika*, 3(April), 59–66.
- Hapsari, I. P., Saputro, T. V. D., & Sadewo, Y. D. (2022). Mathematical literacy profile of elementary school students in Indonesia: A scoping review. *Journal of Educational Learning and Innovation (ELIa)*, 2(2), 279-295.
- Hasanah, U., Fajrie, N., & Kurniati, D. (2023). Peningkatan Pemahaman Konsep Matematika Siswa SD Melalui Pendidikan Matematika Realistik Berbantuan Ular Tangga. *PENDASI Jurnal Pendidikan Dasar Indonesia*, 7(2), 321-330.
- Hasanah, N. (2010). Abstraksi Siswa SMP dalam Belajar Geometri melalui Penerapan Model van Hiele dan Geometer's Sketchpad. Tesis tidak diterbitkan. Bandung: Universitas Pendidikan Indonesia.
- Herlina, E., & Sadewo, Y. D. (2022). Praktikalitas Bahan Ajar Matematika Berbasis Higher Order Thinking Skill. *Journal of Educational Learning and Innovation (ELIa)*, 2(2), 198-211.
- Jeheman, A. A., Gunur, B., & Jelatu, S. (2019). Pengaruh pendekatan matematika realistik terhadap pemahaman konsep matematika siswa. *Mosharafa: Jurnal Pendidikan Matematika*, 8(2), 191-202.
- Jelatu, S., Mandur, K., Jundu, R., & Kurniawan, Y. (2018). Relasi Antara Visualisasi Spasial dan Orientasi Spasial terhadap Pemahaman Konsep Geometri Ruang. *Journal of Songke Math*, 1(1), 47–59.
- Marlina, I., & Fuziawati, L. (2021). Pengaruh pendekatan Realistic Mathematics Education (RME) terhadap peningkatan pemahaman konsep matematis peserta didik di sekolah dasar. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 7(01), 140-162.
- Mulbar, U., & Zaki, A. (2018, June). Design of realistic mathematics education on elementary school students. In *Journal of Physics: Conference Series* (Vol. 1028, No. 1, p. 012155). IOP Publishing.
- Özkaya, A., & Karaca, S. Y. (2017). the Effects of Realistic Mathematics Education on Students' Achievements and Attitudes in Fifth Grades Mathematics Courses. *International Online Journal of Education and Teaching (IOJET)*, 4(2), 185–197.

- Quintero, A. Helvia., & Rosario, H. (2016). *Math makes sense! : a constructivist approach to the teaching and learning of mathematics*. Imperial College Press.
- Sadewo, Y. D., & Purnasari, P. D. (2021). Pengembangan video pembelajaran matematika berorientasi kebudayaan lokal pada sekolah dasar. *Sebatik*, 25(2), 590-597.
- Sadewo, Y. D., Purnasari, P. D., & Muslim, S. (2022). Filsafat matematika: kedudukan, peran, dan persepektif permasalahan dalam pembelajaran matematika. *Inovasi Pembangunan: Jurnal Kelitbangan*, 10(01), 15-28.
- Santosa, D. S. S., & Pohan, D. P. S. (2022). Pengaruh Pendidikan Matematika Realistik Berbantu Powerpoint Interaktif Dalam Meningkatkan Motivasi Dan Hasil Belajar Siswa Kelas 1 Selama Pembelajaran Online Di Sdk Saint John Bekasi. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 7(1), 9-24.
- Saputro, T. V. D., Purnasari, P. D., & Sadewo, Y. D. (2023). Pemahaman Konsep Dasar Matematika Mahasiswa di Wilayah Perbatasan Indonesia–Malaysia: Bagaimana Tantangannya? *Hexagon: Jurnal Ilmu dan Pendidikan Matematika*, 1(2), 145-157.
- Saputro, T. V. D., Purnasari, P. D., Lumbantobing, W. L., & Sadewo, Y. D. (2024). Augmented Reality for Mathematics Learning: Could We Implement It in Elementary School? *Mosharafa: Jurnal Pendidikan Matematika*, 13(1), 163-174.
- Sugriani, A. (2019). Upaya meningkatkan pemahaman konsep penjumlahan pecahan melalui pendekatan pendidikan matematika realistik Indonesia (PMR). *Jurnal Didactical Mathematics*, 1(2), 301041.
- Sundayana, H. R. (2018). *Statistika penelitian pendidikan*.
- Van den Heuvel-Panhuizen, M., & Drijvers, P. (2020). Realistic mathematics education. *Encyclopedia of mathematics education*, 713-717.
- Yayuk, E. (2019). *Pembelajaran matematika Sekolah Dasar (Vol. 1)*. Ummpress.